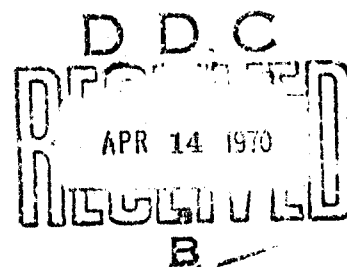


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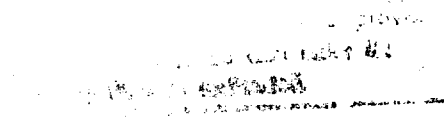
THE DISPLAYS OF A THESAURUS

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THE DISPLAYS OF A THESAURUS

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A great deal of literature exists on the development or construction of a subject authority file or thesaurus, including the importance of vocabulary control techniques. Very little exists in the literature however, on the best way to display the authority file or thesaurus for efficient and consistent use by the indexer and the retriever. Even less information is available on the desirability and usefulness of different displays either singly or in groups. For example, is an alphabetical listing of terms with cross references more useful to an indexer than a complete hierarchical display? What value does the permuted or rotated term index serve? Is it more useful to the indexer or retriever? To the experienced or inexperienced indexer? Is an alphabetical display along with a permuted display of greater utility than an alphabetical display and a hierarchical display? Questions of this nature are very relevant to a system designer concerned with the construction or automation of a thesaurus where cost is a great factor. It is estimated that a thesaurus maintenance program will cost between \$50,000 - \$75,000 to design and code; some programs are available for sale at \$15,000. Considering these costs, it is difficult to understand why thesauri continue to be developed and constructed with so little recorded study of alternative displays. It is also difficult to understand why studies on indexing consistency and effectiveness have not concerned themselves with studying the effect different displays

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of a thesaurus may have on the indexer. Instead these studies generally concern themselves with comparisons of different kinds of authority files, assuming the organizations using these files have the same objectives, or else concern themselves with indexer consistency in terms of experience vs non-experience.

This paper will attempt to describe several display techniques for a thesaurus, including the kinds of displays for hierarchy, categorization, permutation, and semantic and syntactic relationships. Where possible some intuitive discussion will be included on displays which appear to be of more utility to the indexer or the retriever. No attempt was made to perform actual tests of indexers using the same thesaurus in different displays, nor was there time to determine how indexers might supplement one display with another.¹ Instead, this paper may be categorized as one which raises some questions but which is not successful in answering them, or else only partially successful.

Included also in this paper will be a brief discussion of the impact of the computer especially in terms of the assistance the computer offers to file update and maintenance, and the impact of on-line terminals for display.

Thesaurus Definitions

Many definitions exist for a thesaurus:

"A thesaurus is an authority file which can lead the user from one concept to another via various heuristic or intuitive paths. It may be manually operated or mechanized for assignment of index headings."

P. W. Howerton (in Newman, 1965)

"An authority file ... consists of a standardized, controlled vocabulary, with cross-references between the terms of the vocabulary and cross-references to terms of the vocabulary... It consists of either a controlled vocabulary or a set of cross-references, or both."

P. Reisner (in Newman, 1965)

¹ Only one paper was found in the literature which concerned itself with the use indexers made of different displays of a thesaurus. This was a paper by Rainey (1970) which surveyed 75 special libraries to determine how they used the NASA and EJC/DOD thesauri, and which included a question on whether indexers used the special indexes.

"A thesaurus is a device for controlling and displaying an indexing vocabulary."

T. L. Gillum (1964)

"An organized reference of the terms accepted and approved as a standard by participating members of a specialized population in a defined area of information, which identifies the scope of each term by inclusions, exclusions and associations, so that all terms are clear and discrete and in the aggregate are comprehensive for communication and identification of information in the defined area."

P. C. Daniels (1969)

In summary, another definition is offered: A thesaurus is a list of authorized terms or descriptors which serve to standardize and delimit concepts found in publications, and which when structured and displayed reveal relationships of a semantic, syntactic or hierarchical nature.

The type of thesaurus of primary interest to this paper is best represented by the EJC-DOD thesaurus.

Eugene Wall (1969) suggests that there are four basic principles for a thesaurus: the use of natural language; an environment which permits the addition of new terminology; cross references including semantic and hierarchical viewpoints; and what he refers to as "form and format," further defined as "ease of use." There is no indication that the thesaurus should be displayed in more than one form or format although Mr. Wall has certainly contributed significantly to the various ways a thesaurus can be displayed. In fact, most discussions of thesaurus displays are really discussions of the techniques used to reveal the semantic, syntactic and hierarchical structure of cross references embodied in an alphabetical list of terms. Indeed the application of these control techniques results in a display, but this is perhaps more an effect or result of the techniques, rather than the starting point of the thesaurus construction. Or is this the chicken and egg syndrome? Perhaps this is because today's thesaurus builders are operating in a coordinate indexing environment and are not concerned with more fundamental issues of the form of headings or their display.

Since natural language is used and in most cases single words (although some pre-coordinated terms are used) the philosophical discussions of direct headings vs indirect headings or classification are almost non-existent. However, is this really so? Or are today's thesauri with their increased use of auxiliary displays to reveal hierarchical schemes, category listings, and permuted listings intended to provide the best of all worlds never resolved by the battles which raged in the above mentioned philosophical discussions? While the economics of building alternative displays for manually controlled thesauri have conditioned us to accept a single display, and that the alphabetical term display, the computer-managed or automated thesaurus on the other hand, has made alternative displays economically feasible, and as a result offers an opportunity to the thesaurus designer to consider new formats. It is suggested that more study and analysis of alternative displays is essential for a more complete understanding of the role the thesaurus plays in indexing and retrieval operations. It is also recognized that no discussion of thesaurus displays can avoid discussion of control techniques.

Control Techniques

Included in control techniques are term selection, the use of abbreviations and acronyms, use of nouns or other forms, singular vs plural, and alphabetization. Additional control techniques include cross references for semantemes: synonyms, homographs, antonyms, generics, part-whole, related terms, and scope notes and parenthetical expressions to avoid ambiguity.

Alphabetical Display

The alphabetical display of thesaurus terms is the most common form of display, influenced historically by the conventional alphabetical display of indexes and subject heading authority files. In its simplest form the alphabetical display or dictionary display consists of a list of terms or

descriptors in natural language order without cross references. Obviously this display is very limited and offers little assistance to the indexer or retriever, unless the list of terms is very small and a quick glance reveals all the terms. No network or cross references are present to help the user weave his way to a more specific or more generic level, etc. Coates (1960) refers to this display as the alphabetico-specific subject catalogue. In its most common form it does include "see" and "see also" cross references, and attempts to provide through these conventions control over synonyms, class and related terms thereby offering some classification scheme.

Most modern day thesauri are not limited to a simple alphabetical display of terms, but rather incorporate the more complex cross reference scheme found in the more sophisticated alphabetico-specific subject authority files. The notation used may be different however. Instead of "See" and "See also" with X and XX as reciprocals, the notation in current vogue is "See" and "Used for," and "RT" representing related term. "RT" is also used as a reciprocal to "RT." And of course some hierarchy is included in the use of "NT" (narrower term) and "BT" (broader term) notations.

The thesaurus or subject heading authority file which limits itself to the alphabetico-specific display does not provide the user with a complete generic structure however. The classification scheme built into the thesaurus by use of "See" and "RT" cross references is rather limited and the user may have to refer to several terms before arriving at the desired term or terms. This is a gross over-simplification of the problems associated with the alphabetico-specific display. The reader is referred to Coates (1960) and others for more complete discussions.

An alternative approach to resolve the dictionary display problems is the use of an alphabetico-classed display. This authority file is based on an alphabetical display of terms with the use of subdivisions to reveal generic relationships. For example:

Aircraft		Aircraft
Bombers		Aircraft - Bombers
Fighters	or	Aircraft - Fighters
Supersonic		Aircraft - Supersonic
Transport		Aircraft - Transport

instead of: Aircraft see also Bombers, Fighters, etc.

This form of display is helpful to the indexer because it reveals at a glance the related terms. However, the indexer or retriever may not know which is the main class term - Aircraft, or Fighter Aircraft, or Commercial Aircraft, etc. Thus "see" references are required throughout the classed display, increasing the size of the file. An alternative is to provide a second display which is an alphabetical index to the classed file indicating the main or class terms. However this results in a two-step operation and double file maintenance.

The alphabetico-classed file also raises the issue of what constitutes a main or class term, and what is subsumed under it, and how specific the subsumed terms should be. In addition, a term can belong to more than one class.

The modern day thesaurus generally does not attempt to provide a classed thesaurus as the main display. Instead a partial hierarchical display is interwoven in the cross references of the main alphabetical display, and separate hierarchical and category or class displays are provided as auxiliary tools.

Another approach to provide an organic structure to the authority file is the use of inverted headings. This form of display is based on the premise that in multiword subject headings there is one term that is more important, and this is the term the indexer and retriever will use. Also in selecting these "key" words, and listing terms by their key word, a natural class structure is provided. Thus for example:

- Airplanes
- Airplanes, Commercial
- Airplanes, Fighter
- Airplanes, Transport

Where necessary, cross references are provided from the natural language text to the inverted entry.

Although inverted headings are not used in very many modern day thesauri, it is fairly safe to conclude that the complex cross reference structures prevalent today are an attempt to reveal some of the relationships that the inverted headings accomplished. But, is it as safe to conjecture that the permuted or rotated display of thesaurus terms is an attempt to recall the inverted heading structure? Today's thesaurus designer prefers natural language text in alphabetical order, and for good reasons. Yet he also builds category or classed displays, hierarchical, and permuted displays as auxiliary tools. Can this be because the computer is there and easily provides these additional displays? Is it because programmers enjoy the additional coding? Or is it because the designer recognizes, as have librarians who designed the earlier "conventional" systems, that the development and design of a thesaurus is a very complex problem and requires more than a single solution?

In summary, it can be said the more conventional subject authority files dispersed related concepts although each claimed to overcome this problem through the use of cross references, and they tended to use one-way generic cross references, from the generic to the specific, and not the reverse. Again, this is a very superficial review of conventional subject authority files which does not even mention faceted and chain indexing. The reader is referred to the literature for a complete review.

Thesaurus Display

It has been said that coordinate indexing changed the future for the subject indexer and the index designer. With the concept of coordinate indexing and its development and evolution, the modern day thesaurus was born. The reader is referred to the literature for background on coordinate indexing. A useful starting point is Jaster et al., (1962) in which a 45 page bibliography may be found. No attempt will be made either to show

how the thesaurus developed and gradually adopted the concepts of the more conventional authority files. This information is included in the literature on coordinate indexing and vocabulary control.

Today's thesaurus may be an alphabetical display of terms with cross references revealing semantic, syntactic and hierarchical structures, or it may consist of individual alphabetical, hierarchical, permuted, and category or class displays, where the hierarchical and other displays are automatically generated from the main alphabetical display. It may also include information on the number of postings for each term, and may be tied to an on-line system which provides the indexer an opportunity to see what other documents have been indexed under specific terms. Certainly this is a more sophisticated tool than the manual systems could provide. But it is not necessarily a "new" concept to be attributed to the developers of coordinate indexing. Except for including the number of postings for each index term or descriptor in the thesaurus, there are no new concepts that were not known and practiced in the earlier "conventional" systems.¹ Indeed the indexer often referred to the card catalog to see what had been indexed previously under a given term. Until book catalogs were computer produced or on-line systems were designed, the indexer using a coordinate index system had a more circuitous path to follow if he wanted to know what had been indexed under a particular term. It is true however, that the earlier systems did not provide for multiple display of their subject authority files. This had to wait for the computer to make it economically feasible, not necessarily coordinate indexing.

Main Body Display

The alphabetical display² of thesaurus terms is the most common form of display. It generally incorporates the following conventions:

¹The author is not concerned here with the indexing philosophy of coordinate indexing, only with the display of words in a thesaurus or authority file.

²See Figures 1-7 for samples of alphabetical displays.

- Main Term - This is an accepted index term. Associated with it will be the notations: UF, NT, BT, RT.
- UF = Used For - Main terms are often used for or in place of less desirable or unacceptable synonyms or near synonyms.
- See = A synonym or unacceptable term will be entered in the thesaurus, but will refer to the acceptable term.
- NT = Narrower term. This is part of the hierarchical notation referring to a more specific term.
- BT = Broader term. This is part of the hierarchical notation referring to a more generic term.
- RT = Related term. An RT is considered to have close association or relationship to a main term, but is not in the same class as the main term.

Additional control techniques include the use of scope notes and parenthetical expressions to reduce ambiguity and avoid semantic problems.

The use of these control techniques or conventions is intended to serve as a guide to the thesaurus user (indexer or retriever) in the correct selection of terms at the required level of specificity.

At least two approaches are possible in the display of the generic structure internal to the alphabetical display. The designer may elect to include all NT's and BT's associated with a term, or reveal only one level of generic structure -- one BT up and one NT down.

As the example shows (see following page), the generic display provides more immediate information to the thesaurus user, and obviously saves time in the selection of the appropriate terms. The single level structure requires the user to refer to several main terms before the appropriate level of specificity is determined. Certainly the more complete generic structure is desirable from the point of view of the indexer or

Single Level Display

ABS RESINS
BT Acrylate copolymers

ACRYLATE COPOLYMERS
BT Acrylic copolymers
NT ABS resins

ACRYLIC COPOLYMERS
BT Acrylic resins
NT Acrylate copolymers

ACRYLIC RESINS
BT Addition resins
NT Acrylic copolymers

ADDITION RESINS
NT Acrylic resins

Generic Structure Display

ABS RESINS
BT Acrylate copolymers
Acrylic copolymers
Acrylic resins
Addition resins

ACRYLATE COPOLYMERS
BT Acrylic copolymers
Acrylic resins
Addition resins
NT ABS resins

ACRYLIC COPOLYMERS
BT Acrylic resins
Addition resins
NT ABS resins
Acrylate copolymers

ACRYLIC RESINS
BT Addition resins
NT ABS resins
Acrylate copolymers
Acrylic copolymers

ADDITION RESINS
NT ABS resins
Acrylate copolymers
Acrylic copolymers
Acrylic resins

retriever. A possible disadvantage is the increase in size of the thesaurus. Eugene Wall (private correspondence) implies that this "disadvantage" may increase line entries by about 10 percent. However this may be a small penalty, if any, compared to the disadvantage of tracing the structure of the single level display.

A more serious disadvantage of the sophisticated display is that it does not reveal a true hierarchy because it does not distinguish between the levels of specificity of the BT's and NT's. For instance, under Acrylic copolymers, which is the broader or more generic of the two terms Acrylic resins and Addition resins? The same type of question applies to the NT's. Perhaps a specialist in resin technology would have no difficulty with this structure. However, not all indexers, and certainly not all retrievers are experts in resin technology.

In retrieval systems where up-posting is automatically generated and a hierarchical search capability exists; it is critical that the retriever know the hierarchy, or else he may select terms which are inappropriate for his search strategy and which will either inundate him with excessive and/or irrelevant documents, or which will deny him the full display of documents available in the file on his subject. Of course if the indexer is unfamiliar with the hierarchy, and it is not explicitly displayed, he may index the documents at a level which is either too broad or too specific.

Hierarchical Display

In order to overcome this serious disadvantage two options are possible. Either incorporate a strict hierarchical display into the main thesaurus, or produce an auxiliary display -- a hierarchical index. Most thesauri designers have opted for the latter approach, probably because the main alphabetical display with a complete hierarchy would require far more sophisticated programming, and would increase the bulk of the display. Hammond (1967) states to "employ the hierarchical display format throughout

the main body of ... the DOD thesaurus the four-column format would have to have been reduced to three and would have added a hundred pages to the printed book." What is not considered here is the time to be saved by the indexer and the retriever if only one look-up is required.

The hierarchical display as an auxiliary, provides the thesaurus user with a format which clearly outlines the levels of specificity. Thus the examples discussed above, might look like this in the display:

ADDITION RESINS
 Acrylic resins
 Acrylic copolymers
 Acrylate copolymers
 ABS resins

There certainly is no ambiguity here whether Addition resins is broader or more generic to Acrylic resins. The indentations tell the story. This form of display, as mentioned above, does require the user to search in two files -- the main alphabetical and the hierarchical files -- to determine the structure. Of course if the user knew in advance the main term (in this instance Addition resins) he would refer to the hierarchical display immediately.

Some hierarchical displays are designed (EJC-DOD, and NASA) to list as main hierarchical terms only those terms having no BT's and at least two generic levels listed in the main body. Thus the index or display is not a complete display of all possible hierarchies in the thesaurus. (See Figs. 8-9a).

An obvious advantage of the hierarchical display is that it reveals all levels of specificity at each main term subsumed under a class term (has no BT). This does however, raise the shadow of earlier discussions on hierarchical or classed authority files. What really constitutes a class term? Certainly not an artificial convention such as: No BT. And on what basis is a term subsumed under one class and not another? Can a term belong to more than one class? Perhaps the answer to these questions

is to be found in the following quotations from the Information Retrieval Thesaurus of Education Terms: "Our major consideration in constructing a BT-NT hierarchy has been that hierarchy's potential usefulness in indexing and searching. Whether or not the hierarchy effectively mirrors some definite 'objective' reality has not always been of crucial practical importance."

Permuted Display

Gillum (in Daniels, et al., 1969) states that the permuted or rotated index is "essentially a computer sort or KWIC index of the words in the vocabulary ... Since each word in each term is an entry point, all terms having (significant) words in common file together and provide a collection point for terms that are separated because of the use of direct entries."

Thesauri that use natural language, may exhibit a rotated index to serve the same purpose as an inverted file. (See Figs. 10-11). Obviously it is useful only when a thesaurus utilizes multi-word or pre-coordinated terms. If uniterms in their strictest sense comprise the thesaurus, there would be no need for permutations.

The permuted index (inverted file) is probably of more use to the uninitiated or inexperienced indexer (Wall, private correspondence) and retriever, although there is no discussion of the utility of this auxiliary display. Can it be the thesaurus designer is hedging his bets and wants to cover all aspects of building an authority file because the computer is there?

Category Index

Another form of display for a thesaurus is the category display which is intended to divide or segment the thesaurus' terms into broad subject or class areas less rigid than the hierarchical display. The categories, which can be based on discipline, on taxonomy, etc., bring together terms that belong to a group, but which normally are interspersed throughout the

alphabetical display. It appears the groups can be, and indeed are, arbitrarily selected. One basic requirement is that they be mutually exclusive although this in fact may be difficult to achieve since some terms will fall into more than one group. The EJC-DOD thesaurus for example, utilizes the COSATI Subject Category Index as the basis for its category display. (See Figs. 12-13).

Gillum (in Daniels, et al., 1969) states that the subject category "displays are believed to be reasonably coherent and of useful content, but the real utility of this display has not been determined." He does suggest however, that it would contribute to the indexing and retrieval operations "when it is necessary to determine generally the scope of depth of vocabulary development in some subject area." Since this display is intended to bring together terms that represent a logical grouping it is conceivable the individual groups would contribute to the development of microthesauri, but it is difficult to determine to what extent. Tancredi and Nichols (1968) describe how they developed the Microthesaurus of Air Pollution Terms by establishing broad categories for the terms and then extending them to more specific subcategories. (Refer to Fig. 14). They also display a hierarchical treatment of the terms within the categories which invites the thought that perhaps the hierarchical display should also be considered as useful in the development of a microthesaurus.

It may be the only certain use of the subject category display is in developing a means for assigning terms to categories which reflect the categories used in an announcement bulletin. This serves as a useful guide to the listing of new documents in the bulletin, based on the index terms assigned to the documents, and the categories the terms represent in the category display. The DDC Technical Abstract Bulletin and NASA STAR are examples of this usage.

In summary it appears this display assists the indexer or retriever the least. If the indexer was responsible for assigning documents to specific

categories for announcement in a bulletin, its utility would be increased, but this is done by the computer program.

Role of the Computer

The introduction of the computer to the construction and maintenance of the thesaurus has significantly altered the display of the thesaurus and greatly reduced the human editing and maintenance operations. As was mentioned earlier, the automated thesaurus can be programmed to generate reciprocals, check for completeness of cross references and their consistency. More sophisticated programs can provide for hierarchical completeness and consistency. Editing of spelling, term acceptability, term length, etc. is an easy capability of these programs, as well as file update and maintenance. Some programs also include automatic up-posting capability.

While the state of the art indicates it is relatively simple to design and code a program to automatically generate and check reciprocals for a single level hierarchical structure, it is quite another ball game to design a program to generate reciprocals for a full hierarchical display. It has been estimated (and experienced) that this type of program costs upwards of \$50,000! Thus the economic considerations greatly influence the design and completeness of the thesaurus. However, economic considerations must also include cost-benefit considerations. A complete hierarchical display with automatic generation of reciprocals and editing capability is great, but is the cost of designing and coding this program offset by greater indexing and retrieval effectiveness? For instance what is the cost-benefit of all the auxiliary displays discussed above? How are they used and how often, by indexers and retrievers? Are they all required? Or have we fallen into the old trap of manipulating data and producing additional reports as a gimmick to justify computer costs? It would seem an automated thesaurus can reduce indexing and retrieval time, and greatly reduce human editing and file maintenance. Certainly an automated thesaurus should be a subsystem of an automated retrieval system. What the author doesn't

know is how sophisticated should that thesaurus be? It has been said that an information retrieval system is successful in proportion to the success or effectiveness of its thesaurus and the indexing operation. But at what cost?

The computer has also contributed to the development of the thesaurus by providing the capability of counting the frequency of use of terms thereby offering the opportunity to introduce more specific, or broader terms as required. It is true in the conventional systems the card catalog served the same purpose. An indexer could decide it was time to break down a term because of the number of cards filed under it. But the maintenance problem was prohibitive and most indexers tended to avoid noticing the file size. In an automated environment however, correction of posting is relatively simple and encourages file maintenance.

Claire Schultz, et al. (1961) refer to the "combining power" of terms. If an indexer or retriever knows the number of times an index term has been used, it reveals something about the "combining power" of the term. The authors conclude that "... individual descriptors have the ability to combine with other descriptors in proportion to the frequency with which they are used singly. An infrequently used descriptor has little combining power; a frequently used descriptor has high combining power." By associating the thesaurus file with the frequency of postings, the computer provides the indexer with a powerful tool to adjust index terminology. Terms with weak combining power can be eliminated or included in broader terms; terms that have excessive combining power (over-posted) can be made more specific. Thus the thesaurus becomes a more dynamic authority file.

It was mentioned earlier that the card catalog served as a guide to the indexer revealing which documents had been indexed under certain terms. Coordinate index systems made this a more difficult operation. However, the computer has again contributed to this area with the introduction of on-line systems. In such an environment the indexer can search the thesaurus files, note the number of postings under the coordinate terms and

also ask for an on-line display of some of the document references already indexed under the terms, and note the additional terms used to index these documents. (The card catalog revisited?) This form of display can assist in increasing correct usage of terms and contribute to indexer consistency. And of course the benefits to the retriever are equally useful. Such a system is described by Bennett (1969). The reader is also referred to the Lockheed Dialog system and the NASA Recon system.

A further extension of the use of on-line systems in an indexing environment appeared in the literature recently, but the reference has been lost. Essentially, the indexer refers to an automated on-line card catalog and attempts to determine if the bibliographic references or citations in the article to be indexed, are already entered into the card catalog. If any of the citations are there, the indexer next asks to see the index terms assigned to these citations, thereby gaining some clues as to which terms may be likely candidates for indexing the article in hand. This method is an extended citation indexing approach which reveals the superior power of an on-line system for improving indexing consistency and effectiveness.

Although this discussion of the impact of the computer is brief, it should not be interpreted as a snub. The computer has dramatically altered the field of information analysis, storage and retrieval, and has broadened the horizons of librarians and documentalists. Without it information retrieval would still be in the dark ages.

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EJC - 06D THESAURUS OF ENGINEERING AND SCIENTIFIC TERMS

Acyl halides

Acyl halides 0703

BT Acid halides

NT Acyl chloride

Acyltransferases 0601

BT Enzymes

Transferases

Adamsite

USE Quartz monoxide

Adaptability

USE Adaptation

Adaptation 1407

UF Adaptability

NT Acclimatization

Adjustment (psychology)

Dark adaptation

RT—Acuity

Compensation

Correction

—Fitting

—Hibernation

Homeostasis

Reaction time

—Sensitivity

Thresholds (perception)

Adapters 1305

RT Casing tools

Extensions

—Fittings

Sleeves

Adaptive communication 1702

BT Telecommunication

Adaptive control

USE Adaptive systems

and Automatic control

Adaptive electric filters

USE Adaptive systems

and Electric filters

Adaptive optical filters

USE Adaptive systems

and Optical filters

Adaptive systems 1407

UF Adaptive control

† Adaptive electric filters

† Adaptive optical filters

NT Learning machines

RT Artificial intelligence

Automatic theory

—Automatic control

Cybernetics

Process control

Self organizing systems

Adcock antenna 0900

BT Antennas

Directional antennas

Adders

USE Adding circuits

Adder subtractors

USE Adding circuits

Adding circuits 0901

UF Adders

Adder subtractors

Subtractors

BT Circuits

RT Accumulators (computers)

Computer components

—Logic circuits

Adding machines 1505

BT Calculators

Office equipment

Office machines

Addison disease 0605

BT Adrenal cortex diseases

Endocrine diseases

Hypoadrenalism

RT Hypotension

—Tuberculosis

Addition 1201

UF Summing

BT Arithmetic

Number theory

Addition polymerization 0703

BT Addition reactions

Chemical reactions

Polymerization

RT—Addition resins

Condensation polymerization

—Elastomers

Graft polymerization

—Polyester resins

—Thermoplastic resins

—Thermosetting resins

Addition polymers

USE Addition resins

Addition reactions 0703

BT Chemical reactions

NT Addition polymerization

RT—Alkylation

Amination

Carbonylation

Carboxylation

Decarboxylation

Esterification

Etherification

Grignard reactions

—Halogenation

Hydration

—Hydrogenation

Metalation

Nitration

Phosphorylation

Addition resins 1109 1110

Carbon-chain polymers; for

heteroatom chain polymers see

Polyether resins

UF Addition polymers

NT ABS resins

Acrylamide copolymers

—Acrylate copolymers

Acrylic acid copolymers

—Acrylic copolymers

—Acrylic resins

—Acrylonitrile copolymers

Butyl rubber

—Chloroprene resins

—Diene resins

Ethylene copolymers

—Ethylene resins

—Halocarbon resins

—Olefin copolymers

—Olefin resins

Polyacrylamides

—Polyacrylates

Polyacrylic acids

Polyacrylonitrile

Polybutadiene

Polychloroprene

Polychlorotrifluoroethylene

Polyethylene

Polyisobutylene

Polyisoprene

Polymethyl methacrylate

Polypropylene

Polystyrene

Polyvinyl acetate

Polyvinyl alcohol

Polyvinyl chloride

Polyvinyl fluoride

Styrene butadiene resins

—Styrene copolymers

—Styrene resins

Tetrafluoroethylene resins

Vinyl acetate resins

Vinyl acetate copolymers

—Vinyl acetate resins

Vinyl chloride copolymers

—Vinyl chloride resins

—Vinyl copolymers

Vinyl ether resins

Vinylidene chloride resins

—Vinylidene resins

—Vinyl resins

RT Addition polymerization

—Crosslinking

Foam rubber

Graft polymerization

—Plastics processing

—Polymeric films

—Synthetic fibers

—Vulcanized elastomers

Additions (enlargements)

USE Extensions

Additives 1107

UF Doping (additives)

Modifiers

† Mud additives

NT Admixtures

Antilicking additives

Antiknock additives

Cement additives

Extreme pressure additives

Food additives

—Fuel additives

Liquid rocket additives

Lubricant additives

Metal deactivators

Paint thinners

Pulp additives

RT Antifreezes

Antioxidants

Antistatic agents

—Brighteners

—Coatings

Corrosion inhibitors

—Diluents

Dopes

—Drying oils

Extenders

Fillers

Gelling agents

Interstitials

—Lubricants

Nachts

Opacifiers

—Pigments

—Plasticizers

—Preservatives

—Solvents

Stabilizers (agents)

Thickeners (materials)

Thickness

Additions

USE Radial beam tubes

Addressing 1407

RT—Coding

—Computer programming

Address registers

USE Registers (computers)

Adenines 0601 0703

6-Aminopurine and its derivatives

BT Heterocyclic compounds

Nitrogen heterocyclic compounds

Nitrogen heterocyclics with 4 N

Purines

NT—Adenosines

Puromycin

Adenocarcinomas 0605

BT Malignant neoplasms

Neoplasms

RT Breast carcinoma

Adenoma 0605

BT Benign neoplasms

Neoplasms

RT—Breast neoplasms

Adenosine phosphates 0601 0703

BT Esters

Nucleotides

Organic phosphates

Phosphorus organic acid esters

Phosphorus organic compounds

Adenosines 0703 0601

BT Adenines

Heterocyclic compounds

Nitrogen heterocyclic compounds

Nitrogen heterocyclics with 4 N

Nucleosides

Purines

NT Puromycin

Adenoviruses 0613

BT Viruses

NT Acute respiratory disease virus

Oncogenic viruses

Polyoma viruses

Adenovirus infections

USE Respiratory infections

Adherence

USE Adhesion

Adhesion 1407

UF Adherence

Sticking (adhesion)

Tackiness

BT Surface properties

RT Adhesive bonding

—Adhesives

Adhesive strength

Adsorption

—Bonding

Cementing

Cohesion

Dissimilar materials bonding

Fusion (melting)

Gluing

Internal pressure

Laminating

Peeling

—Sealing

Seaming

—Shear tests

Surface chemistry

Taping

Wetting

Adhesions (intestines) 0605

RT—Gastrointestinal diseases

—Intestinal obstructions

Adhesion tests 1402

UF Adhesive tests

NT Peel tests

Adhesive bonding 1308

BT Bonding

RT Adhesion

Dissimilar materials bonding

Adhesive papers 1112 1131

BT Papers

RT Adhesive tapes

Adhesive peel test

USE Peel tests

Adhesives 1101

UF Binders (adhesives)

Cements (adhesives)

NT Glue

Pressure sensitive adhesives

Rubber adhesives

RT Adhesion

Binders (materials)

Bonding strength

Cohesion

Epoxy resins

—Fasteners

—Joints (junctions)

—Sealers

Setting time

Adhesive strength 2012

BT Mechanical properties

RT Adhesion

Bonding strength

Peel strength

Shear strength

—Surface properties

Tensile strength

Adhesive tapes 1101

BT Binding tapes

RT Adhesive papers

Adhesive tests

USE Adhesion tests

Adiabatic conditions 2013

RT Entropy

—Environments

Heat

—Temperature

Adiabatic demagnetization 2012

UF Magnetic cooling

BT Cooling

RT Cryogenics

—Refrigerating

Adiabatic flow 2004

BT Fluid flow

Adies syndrome 0605

BT Eye diseases

Signs and symptoms

Adipates 0703

BT Aliphatic acid esters

Carboxylic acid esters

Dibasic acid esters

Esters

Adiphenine 0615

RT Cholinergic blocking agents

Adipic acid 0703

BT Aliphatic acids

Carboxylic acids

Dibasic organic acids

Organic acids

Adiponitrile 0703

BT Nitriles

Adipose tissue

USE Connective tissue

ABNORMALITIES
(CONT.)

ECCENTRICITY
IRREGULARITIES
UNIQUENESS
ASURIGINES
0404 3402
RT ANTHROPOLOGY
HUMAN BEINGS
INHABITANTS
ABORT APPARATUS
0203 3102 3103
BT SAFETY DEVICES
RT ABORTED MISSIONS
AIRCRAFT SAFETY
ARRESTING GEAR
BARRIERS
#BRAKES (FOR ARRESTING MOTION)
#DRAG DEVICES
EJECTION SEATS
EQUIPMENT
ESCAPE CAPSULES
ESCAPE ROCKETS
ABORT TRAJECTORIES
1904 3006 3102 3103
BT #TRAJECTORIES
RT ABORTED MISSIONS
MATS (SYSTEMS)
ABORTED MISSIONS
3102 3103
RT ABORT APPARATUS
ABORT TRAJECTORIES
DESTRUCTION
ENGINE FAILURE
ESCAPE CAPSULES
ESCAPE ROCKETS
FAILURE
MALFUNCTIONS
MISSIONS
ABRASION
0405 1504 1801 1804
RT ABRASIVES
CHIPPING
CLEANING
CUTTING
DRY FRICTION
EROSION
FILES (TOOLS)
#FRICTION
GRINDING (MATERIAL REMOVAL)
LESIONS
METALLOGRAPHY
#POLISHING
SCORING
WEAR
ABRASION RESISTANCE
1503 1504
BT #MECHANICAL PROPERTIES
RT HARDNESS
RESISTANCE
TOUGHNESS
ABRASIVES
1504 1901 1805 1806
NT CARBORUNDUM (TRADEMARK)
RT ABRASION
ALUMINUM OXIDES
CERAMICS
DIAMONDS
GRIT
PUMICE
QUARTZ
SILICON CARBIDES
ABSCISSAS
USE #COORDINATES
ABSOLUTE TEMPERATURE SCALES
USE TEMPERATURE SCALES
ABSORBENTS
0602 0603 1805
UF MOLECULAR SIEVES
BT SORBENTS
RT ABSORBERS
ABSORBERS (EQUIPMENT)
ABSORBERS (MATERIALS)
ABSORBENTS
AIR CONDITIONING EQUIPMENT
DESICCANTS
MATERIAL ABSORPTION
MATERIALS
ABSORBERS
0603 1409 1504 2202 2405 2901 3203
3303

NASA THESAURUS (ALPHABETICAL LISTING)

(USE OF A MORE SPECIFIC TERM IS
RECOMMENDED--CONSULT THE TERMS
LISTED BELOW)
RT ABSORBENTS
ABSORBERS (EQUIPMENT)
ABSORBERS (MATERIALS)
#ATTENUATORS
CLEANERS
OSCILLATION DAMPERS
SHOCK ABSORBERS
VIBRATION ISOLATORS
ABSORBERS (EQUIPMENT)
0602 1504
(EXCLUDES EQUIPMENT FOR ABSORBING
ENERGY)
RT ABSORBENTS
ABSORBERS
ABSORBERS (MATERIALS)
AIR CONDITIONING EQUIPMENT
CLEANERS
COLUMNS (PROCESS ENGINEERING)
CONDENSERS (LIQUIFIERS)
COOLING SYSTEMS
DECASSING
DRYING APPARATUS
EQUIPMENT
MATERIAL ABSORPTION
REFRIGERATING MACHINERY
SHOCK ABSORBERS
ABSORBERS (MATERIALS)
0602 1504 1805
(EXCLUDES ABSORBENTS--LIMITED TO
MATERIALS FOR ABSORBING RADIATION
RATHER THAN OTHER MATERIALS)
NT NEUTRON ABSORBERS
RADAR ABSORBERS
SOLAR ENERGY ABSORBERS
RT ABSORBENTS
ABSORBERS
ABSORBERS (EQUIPMENT)
#ATTENUATORS
CLEANERS
ELECTROMAGNETIC ABSORPTION
#ELECTROMAGNETIC WAVE FILTERS
#ENERGY ABSORPTION
FILTERS
HEAT SINKS
INSULATION
JACKETS
MATERIALS
RADIATION SHIELDING
REFRIGERANTS
#SHIELDING
SINKS
STOPPING POWER
SUPPRESSORS
ABSORPTANCE
2310
BT #ELECTROMAGNETIC PROPERTIES
OPTICAL PROPERTIES
RT ABSORPTION SPECTRA
ABSORPTIVITY
ALBEDO
CAPTURE EFFECT
COSMIC RAY ALBEDO
DENSITY (MASS/VOLUME)
EARTH ALBEDO
ELECTROMAGNETIC ABSORPTION
LIGHT TRANSMISSION
OPACITY
REFLECTANCE
#SURFACE PROPERTIES
#TRANSMISSION
TRANSMISSIVITY
TRANSMITTANCE
TRANSPARENCY
TURBIDITY
ABSORPTION
3407 3408
(USE OF A MORE SPECIFIC TERM IS
RECOMMENDED--CONSULT THE TERMS
LISTED BELOW)
RT ABSORPTION SPECTRA
ABSORPTION
ATOMIC COLLISIONS
#ATTENUATION
BENEFICIATION
CAPTURE EFFECT
COLLISION PARAMETERS

USE AVIATION MECHANICS

ABILITY

- UP LOW ABILITY
- BT ACADMIC ABILITY
- RT COGNITIVE ABILITY
- INTELLIGENCE
- LANGUAGE ABILITY
- PREDICTIVE ABILITY (TESTING)
- PSYCHOMOTOR SKILLS
- VERBAL ABILITY
- BT ABILITY IDENTIFICATION
- RT ABILITY IDENTIFICATION
- ACHIEVEMENT
- APTITUDE
- ASPIRATION
- GIFTED
- HANDICAPPED
- MECHANICAL SKILLS
- PERFORMANCE
- PRODUCTIVITY
- SLOW LEARNERS
- TALENT
- TALENTED STUDENTS

ABILITY GROUPING

- BT STUDENT GROUPING
- RT ABILITY
- ABILITY IDENTIFICATION
- HOMOGENEOUS GROUPING
- LOW ABILITY STUDENTS

ABILITY IDENTIFICATION

- BT IDENTIFICATION
- RT ABILITY
- ABILITY GROUPING
- IDENTIFICATION TESTS

ABLE STUDENTS

- (ABILITY TO PERFORM OR ABSORB EDUCATION AT A SPECIFIED LEVEL)
- UP CAPABLE STUDENTS
- BT STUDENTS
- RT ACADMIC ABILITY
- ACADMIC ACHIEVEMENT
- ADVANCED STUDENTS
- AVERAGE STUDENTS
- GIFTED
- SUPERIOR STUDENTS

ABSTRACT BIBLIOGRAPHIES
USE ANNOTATED BIBLIOGRAPHIES

ABSTRACT REASONING

- BT THOUGHT PROCESSES
- RT COGNITIVE PROCESSES
- LOGICAL THINKING
- PRODUCTIVE THINKING

ABSTRACTING

- BT WRITING
- RT DOCUMENTATION
- INDEXING

ABSTRACTION TESTS

- BT TESTS
- RT COGNITIVE TESTS
- RT COMPARATIVE TESTING

ACADEMIC ABILITY

- UP SCHOLASTIC ABILITY
- BT ABILITY
- RT ABLE STUDENTS
- ACADMIC ACHIEVEMENT
- ACADMIC APTITUDE
- ACADMIC ASPIRATION
- ACADMIC PERFORMANCE
- ACADEMICALLY HANDICAPPED
- AVERAGE STUDENTS
- COGNITIVE ABILITY
- INTELLIGENCE
- LOW ABILITY STUDENTS
- STUDENT ABILITY
- STUDENTS
- VERBAL ABILITY

ACADEMIC ACHIEVEMENT

- UP ACADMIC SUCCESS
- ACADMIC SUCCESS
- EDUCATIONAL ACHIEVEMENT
- EDUCATIONAL ATTAINMENT
- EDUCATIONAL LEVEL
- SCHOLASTIC ACHIEVEMENT
- SCHOOL ACHIEVEMENT
- STUDENT ACHIEVEMENT
- ACHIEVEMENT
- BT ABLE STUDENTS
- RT ABILITY
- ACADMIC ABILITY
- ACADMIC APTITUDE
- ACADMIC ASPIRATION
- ACADMIC PERFORMANCE
- ACADMIC PROBATION
- ACHIEVEMENT RATING
- ADVANCED PLACEMENT
- GIFTED
- GRADES (SCHOLASTIC)
- HIGH ACHIEVERS
- INTELLIGENCE
- LEARNING DIFFICULTIES
- LOW ACHIEVERS
- READING ACHIEVEMENT
- STUDENTS
- SUPERIOR STUDENTS
- UNDERACHIEVERS

ACADEMIC APTITUDE

- UP LOW SCHOLASTIC APTITUDE
- LOW SCHOLASTIC APTITUDE
- SCHOLASTIC APTITUDE
- STUDENT APTITUDE
- BT APTITUDE
- RT ACADMIC ABILITY

A

ABANDONMENT

UF Escape (Abandonment)
NT RAILOUT
RT DITCHING

ABDOMEN

BT BODY

Abelian fields

USE ALGEBRA

ABLATION

RT AERODYNAMIC HEATING
AEROTHERMOELASTICITY
COOLING
EROSION
SUBLIMATION
VAPORIZATION

ABNORMAL PSYCHOLOGY

Includes general investigations of irregular mental phenomena including behavior or mental disorders, dreams, hallucinations, and mental retardation. For prevention, diagnosis, and therapy of emotional disturbances, see PSYCHIATRY.

UF Clinical psychology
Psychopathology
BT PSYCHOLOGY
NT PSYCHIATRY
STRESS (PSYCHOLOGY)
RT ANXIETY
BEHAVIOR
CRIMINOLOGY
EMOTIONS
FEAR
SENSORY DEPRIVATION

Abrasion

USE ABRASIVES
Abrasion resistance
USE WEAR RESISTANCE

Abrasive coatings

USE ABRASIVES

ABRASIVES

UF Abrasion
Abrasive coatings
Brush powders
Commutator stones
Grinding materials
RT CORUNDUM
DIAMONDS

ABSORPTION

(The retention and conversion into another form of energy of rays, waves, or particles by a substance.)

RT ACOUSTIC INSULATION
ATTENUATION
DESICCANTS
RESONANCE ABSORPTION
SHIELDING
SURFACE PROPERTIES
VIBRATION ISOLATORS

Abstracting

USE ABSTRACTS

ABSTRACTS

UF Abstracting
Briefs
Resumes
Summaries
BT DOCUMENTATION
RT REPORTS

ABUNDANCE

UF Availability

Acaricides

USE PESTICIDES

ACCELERATION

UF G-forces
BT MOTION
RT DECELERATION
THRUST
VELOCITY

Acceleration integrators

USE ACCELEROMETERS
ACCELERATION TOLERANCE
BT TOLERANCES (PHYSIOLOGY)
RT BLACKOUT (PHYSIOLOGY)

ACCELEROMETERS

UF Acceleration integrators

ACCEPTABILITY

RT MAINTAINABILITY
QUALITY CONTROL
STANDARDS
TOLERANCES (MECHANICS)

ACCIDENT INVESTIGATION

RT ACCIDENTS
AVIATION ACCIDENTS
AVIATION INJURIES
AVIATION SAFETY

ACCIDENTS

NT AVIATION ACCIDENTS
COLLISIONS
MOTOR VEHICLE ACCIDENTS

RT ACCIDENT INVESTIGATION

CASUALTIES
DISASTERS
EXPLOSIONS
FIRES
FIRST-AID
HAZARDS
RESCUES
SAFETY
SURVIVAL
WOUNDS & INJURIES

ACCLIMATIZATION

(Physiological adjustment to climatic conditions.)

BT ADAPTATION (PHYSIOLOGY)

ACHIEVEMENT TESTS

(Standardized educational tests constructed to sample the proficiency level or adequacy of past learning in any given field of study.)

BT PSYCHOMETRICS
RT INTELLIGENCE TESTS
PSYCHOMOTOR TESTS

ACID-BASE EQUILIBRIUM

USE ACIDOSIS

Acidity

USE PH

ACIDOSIS

UF Acidemia

ACOUSTIC DETECTORS

BT ACOUSTIC EQUIPMENT
DETECTION
DETECTORS

RT MICROPHONES

POSITION FINDING

ACOUSTIC EQUIPMENT

UF Sound equipment
NT ACOUSTIC DETECTORS
ACOUSTIC FILTERS
ANECHOIC CHAMBERS
ELECTROACOUSTIC
TRANSDUCERS
HYDROPHONES
MEGAPHONES
MICROPHONES
NOISE GENERATORS
SOUND GENERATORS
SOUND REPRODUCTION
SYSTEMS
RT HARMONIC ANALYZERS
HARMONIC OSCILLATORS
NOISE

ACOUSTIC FILTERS

BT ACOUSTIC EQUIPMENT

ACOUSTIC IMPEDANCE

UF Impedance (Acoustics)
BT ACOUSTIC PROPERTIES
RT IMPEDANCE MATCHING

ACOUSTIC INSULATION

UF Insulation (Acoustic)
Insulators (Acoustic)
Soundproofing

RT ABSORPTION

ACOUSTIC PROPERTIES

UF Physical properties (Acoustic)
NT ACOUSTIC IMPEDANCE
SOUND TRANSMISSION
RT HARMONIC ANALYZERS
HARMONIC OSCILLATORS
NOISE
RESONANCE
STANDING-WAVE RATIOS

ACOUSTIC RANGES

RT HYDROPHONES

ACOUSTICS

(Theoretical studies of the production, behavior, and reception of elastic stress waves in all type of media. For theoretical studies of waves in the audible frequency, see SOUND.)

RT ANECHOIC CHAMBERS
MECHANICAL WAVES
PSYCHOACOUSTICS
SOUND
ULTRASONIC RADIATION

ACRYLIC RESINS

UF Lucite
Perspex
Plaxiglex
Polymethylmethacrylate
BT PLASTICS

Activated carbon

USE CARBON

ACTUATORS

(For actuators with feedback, see SERVOMECHANISMS. For indicators, see SYNCHROS.)

NT EXPLOSIVE ACTUATORS
HYDRAULIC ACTUATORS
RT SERVOMECHANISMS
SOLENOIDS

ACUITY

NT VISUAL ACUITY
RT PERCEPTION
SENSORY MECHANISMS
THRESHOLDS (PHYSIOLOGY)
TOUCH

Adaptability (Psychology)

USE ADJUSTMENT (PSYCHOLOGY)

ADAPTATION (PHYSIOLOGY)

UF Altitude adaptation
Dark adaptation
General adaptation syndrome
Light adaptation
Night vision

NT ACCLIMATIZATION

RT STRESS (PHYSIOLOGY)

ADAPTIVE CONTROL SYSTEMS

(Control systems that continuously measure and evaluate dynamic performance and supply continuous readjustments on the basis of the evaluations.)

UF Self-adaptive control systems

BT CONTROL SYSTEMS

ADDITIVES

NT ANTIOXIDANTS
FUEL ADDITIVES
LUBRICANT ADDITIVES

Adenine

USE PURINES

Adenine derivatives

USE PURINES

Adenosine

USE PURINES

ADENOSINE PHOSPHATES

UF Adenylic acid
ADP
ATP

RT MUSCLES

NUCLEOSIDES

NUCLEOTIDES

Adenylic acid

USE ADENOSINE PHOSPHATES

ADHESION

RT BONDING
SURFACE PROPERTIES

ADHESIVE TAPES

BT ADHESIVES

TAPES

ADHESIVES

UF Glues
Metal-glass adhesives
Metal-plastic adhesives
Metal-rubber adhesives
Metal-wood adhesives
NT ADHESIVE TAPES
SEALING COMPOUNDS
RT GAS SEALS
JOINTS
METAL JOINTS
METAL SEALS
SEALS (STOPPERS)

Adjustable-pitch propellers

USE VARIABLE PITCH PROPELLERS

ADJUSTMENT (PSYCHOLOGY)

UF Adaptability (Psychology)
BT BEHAVIOR
RT CONDITIONED REFLEX
GROUP DYNAMICS
LEADERSHIP
PSYCHOLOGY

ADMITTANCE

Adrenal cortex hormones

USE CORTICOSTEROID AGENTS

ADRENAL GLANDS

BT ENDOCRINE GLANDS
GLANDS

ADRENAL MEDULLA HORMONES

BT HORMONES
NT EPINEPHRINE
LEVARTERENOL
RT AUTONOMIC AGENTS
SYMPATHOMIMETIC AGENTS

Adrenalin

USE EPINEPHRINE

Adrenergic agents

USE SYMPATHOMIMETIC AGENTS

Adrenergic nerves

USE AUTONOMIC NERVOUS SYSTEM

ADRENOCORTICOTROPIC

HORMONE

UF Corticotropin

BT HORMONES

ADRENOCORTICOTROPIC

HORMONES

UF ACTH

Corticotropin

BT HORMONES

PITUITARY HORMONES

Adsorbents

USE ADSORPTION

ADSORPTION

UF Adsorbents
BT SURPTION
SURFACE PROPERTIES

Aerobically rotors

USE JET HELICOPTER ROTORS

AERIAL CAMERAS

BT CAMERAS
RT RADAR RECORDING CAMERAS
WIDE-FIELD CAMERAS

AERIAL PHOTOGRAPHS

BT PHOTOGRAPHS

RT MOTION PICTURES

AERIAL PHOTOGRAPHY

BT PHOTOGRAPHY
RT AERIAL RECONNAISSANCE

AERIAL PICKUP SYSTEMS

BT AIRCRAFT EQUIPMENT
RT AIR-DROP OPERATIONS

Aerial propellers

USE PROPELLERS (AERIAL)

AERIAL RECONNAISSANCE

RT AERIAL PHOTOGRAPHY
AIR FORCE OPERATIONS
PHOTO INTERPRETATION
PHOTOGRAMMETRY
RECONNAISSANCE PLANES

AERIAL RUDDERS

UF Rudders (Aerial)

Fig. 5

+ (2-CHLOROETHYL) TRIMETHYLAMMONIUM CHLORIDE	11E	+ ABR TEST	
+ UF CCC		+ USE MILK RING TEST	04B
+ CYCOCEL			
+ BT PLANT REGULATORS		+ ABUTILON THEOPHRASTI	11A
		+ USE CHINA JUTE	
+ ABACARUS HYSTRIX	07E	+ ACACIA	11C
+ UF GRAIN RUST MITE		+ UF WATTLE (TREE)	
		+ BT LEGUMINOSAE	
+ ABGRALLASPIS	07E	+ ACACIA ARABICA	11F
+ BT DIASPIDIDAE		+ UF BABUL ACACIA	
+ ABGRALLASPIS HOWARDI	07E	+ ACACIA CATECHU	11C
+ UF HOWARD SCALE		+ UF KHAIR	
+ ABIES	11F	+ ACALYMMA VITTATUM	07E
+ UF FIR		+ UF CUCUMBER BEETLE	
+ BT CONIFERAE		+ STRIPEO CUCUMBER BEETLE	
+ ABIES ALBA	11F	+ ACANTHOCEPHALA	04B
+ UF SILVER FIR		+ BT NEMATHELMINTHES	
+ ABIES AMABILIS	11F	+ ACANTHOLYDA ERYTHROCEPHALA	07E
+ UF AMABILIS FIR		+ UF PINE FALSE WEBWORM	
+ CASCADES FIR			
+ PACIFIC SILVER FIR			
+ ABIES BALSAMEA	11F	+ ACANTHOMA	10E
+ UF BALSAM FIR		+ BT NEOPLASMS	
+ ABIES CEPHALONICA	11F	+ ACANTHOSCELIDES OBTECTUS	07F
+ UF GREEK FIR		+ UF BEAN WEEVIL	
+ ABIES CONCOLOR	11F	+ ACARIASIS	04B
+ UF WHITE FIR		+ RT MITES	
+ ABIES GRANDIS	11F	+ ACARID MITES	07H
+ UF GRAND FIR		+ USE ACARIDAE	
+ LOWLAND FIR			
+ ABIES LASIOCARPA	11F	+ ACARIDAE	07H
+ UF ALPINE FIR		+ UF ACARID MITES	
		+ NT TYROPHAGUS	
		+ RT MITES	
+ ABIES MAGNIFICA	11F	+ ACARINA	07H
+ UF CALIFORNIA RED FIR		+ NT MITES	
+ RED FIR		+ TICKS	
		+ BT ARACHNIDA	
+ ABIES PINDROW	11F	+ ACARUS SIRO	07F
+ UF PINDROW FIR		+ UF CHEESE MITE	
+ ABIES PINSAPO	11F	+ GRAIN MITE	
+ UF SPANISH FIR			
+ ABIES PROCERA	11F	+ ACER	11F
+ UF NOBLE FIR		+ UF MAPLE	
		+ BT ACERACEAE	
+ ABIES RELIGIOSA	11F	+ ACER MACROPHYLLUM	11F
+ UF PINABETE		+ UF BIGLEAF MAPLE	
+ SACRED FIR		+ BROADLEAF MAPLE	
+ ABIES SACHALINENSIS	11F	+ ACER NEGUNDO	11C
+ UF SAKHALIN FIR		+ UF BOXELDER	
+ ABIES SIBIRICA	11F	+ ACER PALMATUM	11F
+ UF SIBERIAN FIR		+ UF JAPANESE MAPLE	
+ ABIES VENUSTA	11F	+ ACER PLATANOIDES	11F
+ UF BRISTLECONE FIR		+ UF NORWAY MAPLE	
+ ABNORMALITIES	10	+ ACER PSEUDOPLATANUS	11F
+ UF ANOMALIES		+ UF PLANETREE MAPLE	
+ ABORTUS-BANG-RING TEST		+ ACER RUBRUM	11F
+ USE MILK RING TEST	04B	+ UF RED MAPLE	

Subject Headings used by the
AEC. TID 5001 (8th Rev)
Jan 1969.

Fig 6

SUBJECT HEADINGS

A

- A-1 Reactor
 - see Food Irradiation Facilities
- A-1 Reactor (Czechoslovakia)
 - see Bohunice Power Reactor, Unit 1
- ALV
 - see Carrier Vessel Reactor
- A2W
 - see Carrier Vessel Reactor
- A3W
 - see Carrier Vessel Reactor
- A-286 (IRON ALLOY)
 - xx CHROMIUM ALLOYS AND SYSTEMS
 - xx IRON ALLOYS AND SYSTEMS
 - xx MANGANESE ALLOYS AND SYSTEMS
 - xx MOLYBDENUM ALLOYS AND SYSTEMS
 - xx NICKEL ALLOYS AND SYSTEMS
 - xx TITANIUM ALLOYS AND SYSTEMS
- A-esterase
 - see Arylesterase
- A. LINCOLN CLAIM (MONT.)
 - x LINCOLN CLAIM, A. (Mont.)
- AARR
 - see Argonne Advanced Research Reactor
- AM 1.2
 - see Carbamic Acid, Bis(2,2-dimethyl-1-aziridinyl)phosphinyl-, Ethyl Ester
- ANAJU MOUNTAINS DISTRICT (UTAH)
- ABDOMEN
 - see also Peritoneum
- ABDOMINAL VISCERA
 - see also Bladder
 - see also Gall Bladder
 - see also Intestine
 - see also Kidneys
 - see also Liver
 - see also Pancreas
 - see also Spleen
 - see also Stomach
 - xx VISCERA
- Abdoun-Dejan Basin (Morocco)
 - see Dejan-Abdoun Basin (Morocco)
- AGE LINCOLN MINE (WIZ.)
- ABERDEEN FAST PULSE REACTOR FACILITY
 - x APRF
 - x Army Pulse Radiation Facility (Aberdeen)
 - xx REACTORS, FAST
 - xx REACTORS, TEST
- AGUIN DISTRICT (N. MEX.)
- ABLATION
 - (Non-surgical)
- xx HEAT TRANSFER
- Able Burst
 - see Buster-Jangle Operation
- Abnormalities
 - see Dysplasia
- ABRASION
 - see also Erosion
 - see also Grinding
 - see also Polishing
 - see also Wear
 - xx EROSION
 - xx FRICTION
 - xx WEAR
- ABRASIVES
 - Absorption Cross Sections
 - see Cross Sections
 - ABSORPTION SPECTRA
 - see also Atomic Absorption Spectrometry
 - xx SPECTRA
 - ACANTHOCEPHALA
 - xx ANIMALS
 - ACCELERATION
 - see also Velocity
 - x Deceleration
 - xx VELOCITY
 - Acceleration Integrators
 - see Accelerometers
 - Accelerator-Pulsed Fast Assembly
 - see Critical Assemblies
 - Accelerator Storage Rings
 - see Storage Rings
 - Accelerator Targets
 - see Radiation Targets
 - ACCELERATOR TUBES
 - xx POWER SUPPLIES
 - xx TUBES
 - ACCELERATORS
 - see also Beam Separators
 - see also Betatrons
 - see also Brookhaven Synchrotron
 - see also Calutrons
 - see also Cockcroft-Walton Accelerators
 - see also Cyclotrons
 - see also Electron-Ring Accelerators
 - see also Electrostatic Generators
 - see also FFAG Synchrotrons
 - see also Gravimeters
 - see also Linear Accelerators
 - see also Materials Testing Accelerators
 - see also Plasma Accelerators
 - see also Storage Rings
 - see also Synchrocyclotrons
 - see also Synchrotrons
 - see also Van de Graaff Accelerators
 - x Heavy Particle Accelerators
 - xx PARTICLE ACCELERATORS
 - xx GRAVIMETERS
 - xx STORAGE RINGS
- ACCELEROMETERS
 - x Acceleration Integrators
 - xx GAGES AND METERS
 - xx TRANSDUCERS
- ACCIDENTS
 - see also Disasters
 - see also Reactor Safety
 - x Criticality Accidents
 - xx DISASTERS
 - xx SAFETY
- ACCOUNTING
 - see also SF Materials Accounting
- Accumulators
 - see Storage Batteries
- ACE CREEK PROSPECT (SASKATCHEWAN)
- Ace Event
 - see Plowshare Project
- ACE LAKE (SASKATCHEWAN)
- ACE LAKE AREA (SASKATCHEWAN)
- ACE MINE (NORTHWEST TERRITORIES)
- ACENAPHTHENE
- ACENAPHTHENE, 1-METHOXY-
- ACENAPHTHENEQUINONE
- ACENAPHTHYLENE
- ACENES
- Acas
 - see Elementary Particles
- ACETALDENYDE
- ACETALDENYDE--AMMONIA
 - x Ethanol, 1-Amino-
- ACETALDENYDE, 2-CHLORO-
 - Acetaldehyde, Hydroxy-
 - see Glycolaldehyde
- ACETALDENYDE, PHENYL-
- ACETALDENYDE, TRIBROMO-
 - x Bromal
- Acetaldehyde, Trichloro-
 - see Chloral
- ACETALDENYDE, TRIFLUORO-
 - x Fluoral
- ACETALS
 - x Formals
- ACETANIDE
 - see also Diacetanide
 - x Acetic Acid, Anide
- Acetanide, 2,2-Dichloro-N-(p-hydroxy-o-(hydroxyethyl)-p-nitrophenethyl)-
 - see Chloramphenicol
- ACETANIDE, N,N-DIMETHYL-
- ACETANIDE, N-ETHYL-
- ACETANIDE, N-FLUOREN-2-YL-
- ACETANIDE, 2-FLUORO-
- ACETANIDE, 2-ICDO-
- ACETANIDE, 2-MERCAPTO-N-2-NAPHTHYL-
 - x Thionanide
- Acetanide, N-(2-(5-Methoxyindol-3-yl)ethyl)-
 - see Melatonin
- ACETANIDE, N-METHYL-
- ACETANIDE, THIO-
- ACETANIDE, TRICHLORO-
- ACETANIDE, 2,2,2-TRIFLUORO-

Fig 7

30 THESAURUS OF EDUCATION TERMS

ACADEMIC STANDARDS RT 3001 ACCREDITATION ADMISSION	LEARNING RATE REMEDIAL TEACHING SCHOLASTIC PROFICIENCY SCORE	ADULT SN ST RT
ACADEMIC SUCCESS USE ACHIEVEMENT	ACHIEVEMENT TEST UF EDUCATIONAL TEST RT 2002 ACHIEVEMENT	ADULT EDUCATION SN RT
ACCELERATION SN THE PROCESS OF PROGRESSING THROUGH THE SCHOOL GRADES AT A RATE FASTER THAN THAT OF THE AVERAGE CHILD UF SKIPPING RT 6004 ADVANCED PLACEMENT PROGRAM RATE	ACHROMATIC COLOR UF BLACK AND WHITE RT 9003	ADVANCED RT
ACCENTUATION SN SPEECH RT 9004 SPEAKING	ACOUSTICS SN SOUND AFFECTING QUALITIES OF A ROOM RT 9004	ADVANCEMENT USE
ACCEPTANCE SN GENERAL ATTITUDE OF ONE PERSON TOWARD ANOTHER RT 7003	ADAPTABILITY RT 7003 SOCIALIZATION	ADVERBS RT
ACCIDENT SN RT 8001 ACCIDENT PREVENTION TRAFFIC SAFETY	ADDICTION RT 8001 DRUGS JUVENILE DELINQUENCY MENTAL HEALTH	ADVERTISING RT
ACCIDENT INSURANCE RT 23001	ADDITION SN ARITHMETICAL CALCULATION RT 17005	ADVISING USE
ACCIDENT PREVENTION RT 2007 ACCIDENT SCHOOL INJURY	ADEQUACY SN OF AMOUNT OF SUPPLIES OR STAFF UF INSUFFICIENCY SUFFICIENCY RT 3002 ABILITY ACHIEVEMENT FEELING OF INADEQUACY	ADVISOR USE
ACCIDENTAL ERROR SN UNPREDICTABLE DEPARTURE FROM THE TRUE VALUE RT 5005 MEASUREMENTS	ADJECTIVES RT 16001	AESTHETICS RT
ACCOMPLISHMENT USE ACHIEVEMENT	ADJUSTMENT SN RT 2021 SOCIAL ADJUSTMENT	AFFECT SN RT
ACCOUNTANT RT 1008	ADMINISTRATING SN UF COORDINATING MANAGING RT 2007 DECISION MAKING TEACHER ADMINISTRATION RELATIONS TEST ADMINISTRATION	AFFECT Y RT
ACCOUNTING RT 17006	ADMISSION SN ADMITTANCE TO A SCHOOL UF ENTRANCE MATRICULATION RT EARLY ADMISSION 2010 ACADEMIC STANDARDS ADMISSION TEST	AFFECTIVE SN RT
ACCREDITATION SN OF EDUCATIONAL INSTITUTIONS RT 2007 ACADEMIC STANDARDS	ADMISSION TEST RT 2002 ADMISSION	AFFECTIVE SN RT
ACCULTURATION USE CULTURAL ASSIMILATION	ADOLESCENCE SN AGE TWELVE TO TWENTY ONE UF TEEN AGE RT EARLY ADOLESCENCE LATE ADOLESCENCE MID ADOLESCENCE 8005	AGE USE
ACCURACY UF CORRECTNESS PRECISION RT 8003 CLARITY CONSISTENCY ERROR	ADOPTION USE LEGAL ADOPTION	AGED USE
ACHIEVEMENT UF ACADEMIC IMPROVEMENT ACADEMIC SUCCESS ACCOMPLISHMENT ATTAINMENT IMPROVEMENT PERFORMANCE RT OVERACHIEVEMENT UNDERACHIEVEMENT RT 8004 ACHIEVEMENT TEST COURSE COMPLETION		ADDRESS ST RT

HIERARCHICAL INDEX

Antennas

Amides (Con.)

- Thioureas
- Fibrinolysin
- Ureas

Amines

- Acyclic amines
- Diethylamine
- Dimethylamine
- Ethanolamine
- Ethylamine
- Methylamine
- Amidines
- Alkylamines
- Benzylamine
- Diethylpropion
- Dopamine
- Epinephrine
- Mephentermine
- Methylene blue
- Norepinephrine
- Phenoxybenzamine
- Trimethobenzamide
- Tyramine
- Arylamines
- Anilines
- Oxophenarsine
- Sulfanilamide
- Sulfanilic acid
- Toluidines
- Diphenylamine
- Methylene blue
- Phenolamine
- Phenylenediamines
- Catecholamines
- Dopamine
- Epinephrine
- Norepinephrine
- Fluoroamines
- Heterocyclic amines
- Hexamethylenetetramine
- Physostigmine
- Piperidines
- Meperidine
- Mepivacaine
- Methylphenidate
- Pipradrol
- Thalidomide
- Trihexyphenidyl
- Tropanes
- Atropine
- Cocaine
- Hyoscyamine
- Scopolamine
- Nitramines
- Nitramines
- Polyamines
- Diamines
- EDTA
- Ethylenediamine
- Guanidines
- Guanethidine
- Guanidine nitrates
- Phenylenediamines
- Hexamethylenetetramine
- Primary amines
- Anilines
- Oxophenarsine
- Sulfanilamide
- Sulfanilic acid
- Toluidines
- Cycloserine
- Dopamine
- Ethanolamine
- Ethylamine
- Ethylenediamine
- Methylamine
- Norepinephrine
- Phenylenediamines
- Pyrolidines
- Physostigmine
- Poldine
- Quinacrine
- Secondary amines
- Diethylamine
- Dimethylamine
- Diphenylamine
- Epinephrine
- Mephentermine
- Tertiary amines
- Aminopyrine
- Anisodazine
- Chlorazondamine
- Diethylpropion
- Methylene blue
- Trimethobenzamide
- Tropanes
- Atropine
- Cocaine

- Hyoscyamine
- Scopolamine
- Triethylmelamine
- Unsymmetrical dimethylhydrazine

Ammonium compounds

- Aluminum ammonium sulfate
- Ammonium halides
- Ammonium hydroxide
- Ammonium nitrate
- Ammonium perchlorate
- Ammonium sulfate
- Quaternary ammonium salts
- Tetramethyl ammonium salts

Amphibious operations

- Amphibious demonstrations
- Diversionary landings
- Amphibious raids
- Amphibious withdrawals

Analysis (mathematics)

- Complex variables
- Analytic continuation
- Analytic functions
- Entire functions
- Cauchy integral formula
- Conformal mapping
- Meromorphic functions
- Elliptic functions
- Rational functions
- Zeta function
- Riemann surfaces
- Special functions
- Airy function
- Bessel functions
- Hankel functions
- Beta function
- Exponential functions
- Gamma function
- Harmonic functions
- Hyperbolic functions
- Hypergeometric functions
- Laguerre functions
- Legendre functions
- Logarithm functions
- Mathieu functions
- Orthogonal functions
- Spherical harmonics
- Functional analysis
- Banach space
- Banach algebras
- Hilbert space
- Functionals
- Generating functions
- Harmonic analysis
- Almost periodic functions
- Integral equations
- Fredholm equations
- Singular integral equations
- Volterra equations
- Wiener-Hopf equations
- Integral transformations
- Bessel transformation
- Convolution integrals
- Fourier transformation
- Hankel transformation
- Laplace transformation
- Real variables
- Calculus
- Bounded functions
- Continuity (mathematics)
- Differential calculus
- Inflection points (mathematics)
- Integral calculus
- Convergent integrals
- Divergent integrals
- Limits (mathematics)
- Monotone functions
- Sequences (mathematics)
- Series (mathematics)
- Convergent series
- Dirichlet series
- Divergent series
- Asymptotic series
- Expansions (mathematics)
- Fourier series
- Power series
- Taylor series
- Maclaurin series
- Vector analysis
- Curl (vectors)
- Parametric equations
- Calculus of variations
- Differential equations
- Greens function
- Linear differential equations
- Nonlinear differential equations
- Duffings differential equation

- Lysapunov functions
- Van der Pol differential equation
- Ordinary differential equations
- Duffings differential equation
- Sturm-Liouville theory
- Van der Pol differential equation
- Partial differential equations
- Boundary value problems
- Cauchy problem
- Dirichlet problem
- Potential theory
- Elliptic differential equations
- Hyperbolic differential equations
- Parabolic differential equations
- Fourier analysis
- Fourier integrals
- Fourier series
- Periodic functions
- Generalized functions
- Delta function
- Measure and integration
- Discontinuity (mathematics)
- Ergodic theory
- Integral calculus
- Convergent integrals
- Divergent integrals
- Weighting functions

Analyzers

- Electric analyzers
- Frequency analyzers
- Harmonic analyzers
- Interference analyzers
- Network analyzers
- Noise analyzers
- Pulse analyzers
- Pulse height analyzers
- Wave analyzers
- Electrostatic analyzers
- Ion traps (instrumentation)
- Sound analyzers
- Spectrum analyzers

Anhydrides

- Carboxylic acid anhydrides
- Acetic anhydride
- Benzic anhydride

Antennas

- Aircraft antennas
- Beacon antennas
- Broadband antennas
- Biconical antennas
- Dicone antennas
- Conical antennas
- Cylindrical antennas
- Log periodic antennas
- Rhombic antennas
- Spiral antennas
- Traveling wave antennas
- Cassegrain antennas
- Circular antennas
- Coupled antennas
- Dipole antennas
- Cylindrical antennas
- Sleeve antennas
- Directional antennas
- Adcock antennas
- Backfire antennas
- Corner reflector antennas
- Helical antennas
- Horn antennas
- Lens antennas
- Luneberg lenses
- Log periodic antennas
- Loop antennas
- Parabolic antennas
- Rotating antennas
- Radar antennas
- Rotating antennas
- Rhombic antennas
- Slot antennas
- Steerable antennas
- Synthetic aperture antennas
- Traveling wave antennas
- Yagi antennas
- Ground vehicle antennas
- Leaky wave antennas
- Long wire antennas
- Microwave antennas
- Horn antennas
- Lens antennas
- Luneberg lenses
- Slot antennas
- Meissle antennas
- Multiple beam antennas
- Navigational antennas
- Direction finding antennas
- Wullenweber antennas

ABNORMALITIES
MAGNETIC ANOMALIES
GEMAGNETIC HOLLOW

ACCUMULATORS
DUST COLLECTORS
SOLAR COLLECTORS
SOLAR REFLECTORS

ACIDS
AMINO ACIDS
ADENINES
ALANINE
ASPARTIC ACID
COENZYMES
CYSTEINE
FOLIC ACID
GLUTAMIC ACID
GLUTAMINE
GLUTATHIONE
GLYCINE
HIPPURIC ACID
HISTIDINE
LEUCINE
LYSINE
MELANOIDIN
METHIONINE
NUCLEASE
PAPAIN
PEPTIDES
HYPERTENSIN
PHENYLALANINE
PROTOPROTEINS
PYRIMIDINE NUCLEOTIDES
THYROXINE
TRYPTOPHAN
URIDYLIC ACID
AMOBARBITAL
ASCORBIC ACID
BORIC ACIDS
BUTYRIC ACID
CARBONIC ACID
CARBOXYLIC ACIDS
ACETIC ACID
ETHYLENEDIAMINETETRAACETIC ACIDS
VERSENE
IODOACETIC ACID
ACETYSALICYLIC ACID
ACRYLIC ACID
ALANINE
ASPARTIC ACID
BENZILIC ACID
BENZOIC ACID
CITRIC ACID
DICARBOXYLIC ACIDS
TEREPHTHALATE
FULIC ACID
FORMHYDROXAMIC ACID
FORMIC ACID
HEROGENES (TRADEMARK)
LACTIC ACID
LYSINE
NICOTINIC ACID
OLEIC ACID
OXALIC ACID
GRAMIC ACIDS
PHOSPHONIC ACID
STEARIC ACID
THYROIDINE
VALERIC ACID
CINCHIC ACID
CYANURIC ACID
CYTIDYLIC ACID
QUINACRIDONE CARBOXYLIC ACID
FATTY ACIDS
ISOBUTYRIC ACID
LIPIDIC ACID
OLEIC ACID
PROPIONIC ACID
SEBACIC ACID
VALERIC ACID
VERSENE
HYDRAZIC ACID
HYDROCHLORIC ACID
HYDROFLUORIC ACID
NITRIC ACID
NUCLEIC ACIDS

Fig. 9a

-32- NASA THESAURUS (HIERARCHICAL DISPLAY)

ACIDS
(CONT.)

HEMINURIC ACIDS
ADENINIS
URIDYLIC ACID
OXIDASI
PERCHLORIC ACID
PHOSPHORIC ACID
SULFURIC ACID
THYMIDINE
THYMINE
URIC ACID

ACOUSTIC PROPERTIES
ACOUSTIC IMPEDANCE
ACOUSTIC INSTABILITY
ACOUSTIC SCATTERING
REVERBERATION
ACOUSTIC VELOCITY
SOUND INTENSITY
ZERO SOUND

ACTINIDE SERIES COMPOUNDS
PLUTONIUM COMPOUNDS
PLUTONIUM FLUORIDES
PLUTONIUM OXIDES
THORIUM COMPOUNDS
THORIUM FLUORIDES
THORIUM OXIDES
URANIUM COMPOUNDS
URANIUM CARBIDES
URANIUM FLUORIDES
URANIUM OXIDES

ACUITY
VISUAL ACUITY
HYPEROPIA

ADAPTATION
ACCLIMATIZATION
ALTITUDE ACCLIMATIZATION
COLD ACCLIMATIZATION
DESERT ADAPTATION
RETINAL ADAPTATION
DARK ADAPTATION
LIGHT ADAPTATION

ADDITIVES
ADMIXTURES
ANTIFREEZES
ANTIICING ADDITIVES
ANTILOCK ADDITIVES
ANTIOXIDANTS
OIL ADDITIVES
OPACIFIERS
PLASTICIZERS
PROPELLANT ADDITIVES
PROPELLANT BINDERS
SOLID ROCKET BINDERS

AERODYNAMIC CHARACTERISTICS
AERODYNAMIC BALANCE
AERODYNAMIC DRAG
SUPERSONIC DRAG
AERODYNAMIC STABILITY
LIFT
INTERFERENCE LIFT
JET LIFT
ROTOR LIFT
ZERO LIFT
STATIC AERODYNAMIC CHARACTERISTICS

AERODYNAMIC FORCES
AERODYNAMIC DRAG
SUPERSONIC DRAG
AERODYNAMIC LOADS
BLAST LOADS
GUST LOADS
WING LOADING
HYPERSONIC FORCES
LIFT
INTERFERENCE LIFT
JET LIFT
ROTOR LIFT

Isotopes

Iodine organic compounds
Iodo
 • Iodo compounds
Iodoalkanes
Iodoform
Iodohydrocarbons
Iodometalates
 Potassium iodometalates
Ion
 • Exchangers (ion)
 • Hydrogen ion activity
 • Hydrogen ion concentration
 • Ion accelerators
 • Ion beams
 • Ion bombardment
 • Ion chambers
 • Ion concentration (density)
 • Ion currents
 • Ion density (concentration)
 • Ion emission
 • Ion engines
 • Ion exchange membranes electrolysis
 • Ion exchange resins
 • Ion exchangers
 • Ion exchanging
 • Ion excretion
 • Ion guns
 • Ion irradiation
 • Ion microscopes
 • Ion propulsion
 • Ion pumps
 • Ion sources
 • Ion thrusters
 • Ion traps (instrumentation)
 • Ion vacuum gauges
Ionic
 • Ionic conductivity
 • Ionic crystals
 • Ionic mobility
 • Ionic regulation (physiology)
Ionization
 Gas ionization
 Ionization chambers
 Ionization coefficients
 • Ionization counters
 Ionization gages
 Ionization potentials
 • Meteoric ionization
Ionized
 • Diazo compounds (ionized)
 • Ionized gases
Ionizing
 Ionizing radiation
Ionograms
Ionosondes
Ionosphere
 Topside ionosphere
Ionospheric
 • Ionospheric absorption
 Ionospheric disturbances
 • Ionospheric plot is
 Ionospheric propagation
 Ionospheric storms
 Sudden ionospheric disturbances
Ionospherics
Ions
 Carbonium ions
 Complex ions
 • Hydrogen ions
 • Negative ions
 Organic ions
 Positive ions
IPL
 IPL (programming language)
Ipsilateral
IR
 IR drop
Iranian
 Iranian languages
Iraser
IRBM
Ircones
Iridium
 Iridium alloys
 Iridium containing alloys
 Iridium halides
 Iridium inorganic compounds
 Iridium intermediates
 Iridium isotopes
 Iridium organic compounds
Iridocyclitis
Iris
 Iris anatomy
Irisless
 Irisless mechanical apertures
Irisless
Iron
 A-100 cast iron
 Alpha iron

Aluminum iron hardeners
Angle iron
Cast iron
Channel iron
Delta iron
• Ductile iron
Ductile iron castings
Gamma iron
Gray iron
Gray iron castings
Iron alloys
Iron and steel industry
Iron carbides
Iron castings
Iron chlorides
Iron containing alloys
Iron cyanides
Iron deficiency anemia
• Iron foundries
 Iron halides
 Iron inorganic compounds
 Iron intermetallics
 Iron isotopes
 Iron nitrates
 Iron ore deposits
 Iron ores
 Iron organic compounds
 Iron oxides
 Iron powder
 Iron rich Permalloy®
 Iron sulfate
 Iron sulfides
• Malleable cast iron
Malleable iron
Malleable iron castings
Mottled iron
Modular iron
Pig iron
• Spheroidal iron
Sponge iron
• Trap iron
 Uranium iron alloys
 White iron
 White iron castings
 Wrought iron
 Yttrium iron garnets
Irons
 Electric irons
 Soldering irons
• Waffle irons
irradiance
 irradiance meters
irradiated
 irradiated foods
irradiation
 Alpha irradiation
• Bombardment (production)
 Deuteron irradiation
 Electron irradiation
 Food irradiation
 Gamma irradiation
 Ion irradiation
 Neutron irradiation
 Partial body irradiation
 Proton irradiation
 Whole body irradiation
 X ray irradiation
irregularities
irrelevance
irreversible
 irreversible processes
Irrigated
 Irrigated land
Irrigation
 Irrigation canals
 Irrigation pipes
 Sprinkler irrigation
 Subsurface irrigation
 Surface irrigation
Ischemia
Ischium
isotropic
 isotropic flow
Islands
 Ice islands
 Islands (geomorphs)
 • Traffic islands
Isosinyl
 isobutyl acetate
Isobars
 isobars (pressure)
 Nuclear isobars
Isobutane
Isobutylene
Isocyanate
 isocyanate resins
Isocyanates
isocyanic
 isocyanic acid

• Isocyanides
Isoindoles
Isoindolines
Isolation
Isolators
• Shock isolators
• Vibration isolators
Isoleucine
Isomerases
Isomeric
• Isomeric transitions
Isomerism
• Molecular isomerism
Isomerization
Isomers
• Isomers (nuclear)
• Nuclear isomers
Iso morphisms
Isoniazid
Isonicotinamides
Isonitriles
• **Ispentane**
• Isophthalic
• Isophthalic acid
• **Iso pleths**
Isoprene
Isopropoxide
• Aluminum isopropoxide
Isopropyl
• Isopropyl benzene
Isopters
Isoquinotines
Iso spin
Iso stasy
Isostatic
• Isostatic change
• Isostatic pressing
Isothermal
• Isothermal annealing
• Isothermal transformation
• Isothermal treatment
Isotherms
Isothiocyanates
• **Isothionicotinamides**
Isothiuronium
• Isothiuronium compounds
Isotope
• Cascades (isotope separation)
• Chemical exchange isotope separation
• Electromagnetic isotope separation
• Isotope availability
• Isotope effect
• Isotope exchange
• Isotope impurities
• Isotope separation
• Isotope shift
Isotopes
• Actinium isotopes
• Aluminum isotopes
• Americium isotopes
• Antimony isotopes
• Argon isotopes
• Arsenic isotopes
• Astatine isotopes
• Barium isotopes
• Beryllium isotopes
• Bismuth isotopes
• Boron isotopes
• Bromine isotopes
• Cadmium isotopes
• Calcium isotopes
• Californium isotopes
• Carbon isotopes
• Cerium isotopes
• Cesium isotopes
• Chlorine isotopes
• Chromium isotopes
• Cobalt isotopes
• Copper isotopes
• Curium isotopes
• Dysprosium isotopes
• Erbium isotopes
• Eritrium isotopes
• Europium isotopes
• Fermium isotopes
• Francium isotopes
• Gadolinium isotopes
• Gallium isotopes
• Germanium isotopes
• Gold isotopes
• Hafnium isotopes
• Helium isotopes
• Holmium isotopes
• Hydrogen isotopes
• Indium isotopes
• Iodine isotopes

ACOUSTIC

NASA THESAURUS (PERMUTED INDEX)

ACOUSTIC
ACOUSTIC ATTENUATION
ACOUSTIC
ACOUSTIC DELAY LINES
ACOUSTIC DUCTS
ACOUSTIC EXCITATION
ACOUSTIC FATIGUE
ACOUSTIC IMPEDANCE
ACOUSTIC INSTABILITY
ACOUSTIC MEASUREMENTS
ACOUSTIC NOZZLES
ACOUSTIC PROPAGATION
ACOUSTIC PROPERTIES
ACOUSTIC SCATTERING
ACOUSTIC SIMULATION
ACOUSTIC STREAMING
ACOUSTIC VELOCITY
COHERENT ACOUSTIC RADIATION
ACOUSTICS
UNDERWATER ACOUSTICS
ACQUISITION
DATA ACQUISITION
TARGET ACQUISITION
ACRYLIC
ACRYLIC ACID
ACRYLIC RESINS
ACTH
ADRENOCORTICOTROPIN (ACTH)
ACTINIDE
ACTINIDE SERIES
ACTINIDE SERIES COMPOUNDS
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OSCILLATORY ACTION
ACTIONS
EVASIVE ACTIONS
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PROPELLANT ACTUATED DEVICES
PROPELLANT ACTUATED INSTRUMENTS
ACTUATOR
ACTUATOR DISKS
ACUITY
VISUAL ACUITY
ADAPTATION
DARK ADAPTATION
DESERT ADAPTATION
LIGHT ADAPTATION
RETINAL ADAPTATION
ADAPTIVE
ADAPTIVE CONTROL
ADAPTIVE FILTERS
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ADDING
ADDING CIRCUITS
ADDISONS
ADDISONS DISEASE
ADDITION
ADDITION RESINS
ADDITION THEOREM
ADDITIVES
ANTICLING ADDITIVES
ANTIKNOCK ADDITIVES
OIL ADDITIVES
PROPELLANT ADDITIVES
ADDRESS
PUBLIC ADDRESS SYSTEMS
ADENOSINE
ADENOSINE DIPHOSPHATE (ADP)
ADENOSINE TRIPHOSPHATE (ATP)
ADEPT
MONEYWELL ADEPT COMPUTER
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ADHESION TESTS
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ADIABATIC CONDITIONS
ADIABATIC EQUATIONS
ADIABATIC FLOW
ADIPOSE
ADIPOSE TISSUES
ADIPREN
ADIPRENE (TRADEMARK)
ADP
ADENOSINE DIPHOSPHATE (ADP)
ADRENAL
ADRENAL GLAND
ADRENAL METABOLISM
ADRENOCORTICOTROPIN
ADRENOCORTICOTROPIN (ACTH)
ADSORPTION
GIBBS ADSORPTION EQUATION
ADVANCED
ADVANCED RANGE INSTRUMENTATION SHIP
ADVANCED SODIUM COOLED REACTOR
ADVANCED TEST REACTORS
ADVANCED VIDICON CAMERA SYSTEM (AVCS)
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AERIAL EXPLOSIONS
AERIAL PHOTOGRAPHY
AERIAL RECONNAISSANCE
AERIAL RUDDERS
AEROBEE
AEROBEE ROCKET VEHICLE
AERODYNAMIC
AERODYNAMIC BALANCE
AERODYNAMIC BRAKES
AERODYNAMIC CHARACTERISTICS
AERODYNAMIC COEFFICIENTS
AERODYNAMIC CONFIGURATIONS
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AERODYNAMICS
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AEROS SATELLITE
AEROSPACE
AEROSPACE ENGINEERING
AEROSPACE ENVIRONMENTS
AEROSPACE INDUSTRY
AEROSPACE MEDICINE
AEROSPACE SCIENCES
AEROSPACE SYSTEMS
AEROSPACE VEHICLES
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AFTERENT NERVOUS SYSTEMS
AFTEREFFECTS
MOTION AFTEREFFECTS
AFTERGLOW
HELIUM AFTERGLOW
OXYGEN AFTERGLOW
AGE
AGE FACTOR
RADIOACTIVE AGE DETERMINATION
AGENA
AGENA A ROCKET VEHICLE
AGENA B RANGE PROGRAM
AGENA B ROCKET VEHICLE
AGENA C ROCKET VEHICLE
AGENA D ROCKET VEHICLE
AGENA ROCKET VEHICLES
ATLAS AGENA B LAUNCH VEHICLE
ATLAS AGENA LAUNCH VEHICLES
THOR AGENA LAUNCH VEHICLE
AGENTS
ACCELERATING AGENTS
ANTIHYPERTENSIVE AGENTS
STABILIZERS (AGENTS)
AGING
AGING (BIOLOGY)
AGING (METALLURGY)

SUBJECT CATEGORY INDEX

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0903 (Con.)
Synchronous motors
Voltage gain
Voltage regulation
Wiring
Wiring diagrams
Wound-rotor induction motors

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Information Theory
Coders
Coding theory
Communication theory
Data transmission
Decoders
Error correction codes
Error detection codes
Huffman code
Information capacity
Information theory
Intelligibility
Symbols

0905
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Acoustic delay lines
AC to DC converters
Adcock antennas
Aircraft antennas
Amplifiers
Antenna amplifiers
Antenna arrays
Antenna couplers
Antenna feeds
Antennas
Antenna scanner
Audio amplifiers
Autotransformers
Backfire antennas
Bandpass amplifiers
Beacon antennas
Biconical antennas
Broadband amplifiers
Broadband antennas
Cascade control
Cassegrain antennas
Circuits
Circular antennas
Class A amplifiers
Class B amplifiers
Class C amplifiers
Conical antennas
Constant current transformers
Copper oxide rectifiers
Corner reflector antennas
Counterpoises
Coupled antennas
Crystal video receivers
Current amplifiers
Current regulators
Current transformers
Cylindrical antennas
DC to DC converters
Demodulators
Dielectric amplifiers
Differential amplifiers
Duplexers
Dipole antennas
Direct coupled amplifiers
Directional antennas
Direction finding antennas
Discone antennas
Distributed amplifiers
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Echo repeaters
Electric controllers
Electric converters
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Frequency dividers
Frequency multipliers
Frequency synthesizers
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Ground vehicle antennas
Half wave rectifiers
Hall generators
Helical antennas
Horn antennas
Infrared parametric amplifiers

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Integrators
Intermediate frequency amplifiers
Laser amplifiers
Latching relays
Leaky wave antennas
Lens antennas
Logarithmic amplifiers
Log periodic antennas
Long wire antennas
Loop antennas
Low noise amplifiers
Low noise preamplifiers
Luneberg lenses
Magnetic modulators
Mercury arc rectifiers
Microphones
Microwave amplifiers
Microwave antennas
Microwave receivers
Missile antennas
Modems
Modulators
Monopole antennas
Multiple beam antennas
Navigational antennas
Noise generators
Nutating antennas
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Operational amplifiers
Parabolic antennas
Parametric amplifiers
Phased arrays
Piezoelectric transducers
Polarized relays
Potential transformers
Power amplifiers
Power distribution lines
Power lines
Power subtransmission lines
Power transformers
Power transmission lines
Power transmission towers
Preamplifiers
Pulse amplifiers
Pulse generators
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Radiofrequency generators
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Rocket antennas
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Servomotors
Ship antennas
Signal generators
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Synchro differential generators
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Traveling wave antennas
Tuned amplifiers
Tuners
Turnstile antennas
Underground antennas
Unifilar antennas
Video amplifiers
Voltage amplifiers
Voltage dividers
Voltage regulators
Waveform generators
Waveguides

Wullenweber antennas
Yagi antennas

0906
Telemetry
Biotelemetry
Decommutators
Electrical telemetry
Mechanical telemetry
Radio telemetry
Telemetry antennas
Telemetry data
Telemetry equipment
Telemetry receivers
Telemetry transmitters
Telemetry

Nuclear thermionic converters
Open cycle EHD generators
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Plasma closed cycle MHD generators
Portable thermionic converters
Portable thermoelectric generators
Pulsed power MHD generators
Radiation resistant solar cells
Radioisotope thermoelectric devices
Regenerative fuel cells
Regenerators
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Saturable reactors
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Solar energy concentrators
Solar generators
Solar reflectors
Spacecraft electric power units
Standby power generation
Standby power generators
Static inverters
Thermal power plants
Thermionic collectors
Thermionic converters
Thermionic heat pipes
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1000 Nonpropulsive Energy Conversion

1001
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Electric power generation
Electrochemical power generation
Gas turbine power generation
Hydroelectric power generation
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Solar power generation
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Thermoelectric power generation
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Uninterruptible power generation
Wind power generation

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Direct power generators
Dynamotors
Electric generators
Electric power plants
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Electrohydrodynamic power generation
Electrostatic generators
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Fossil fuel thermionic converters
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Fuel cell electrodes
Fuel cell electrolytes
Fuel cell fuels
Fuel cell oxidants
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Fuel cell separators
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Hand generator
Hydroelectric generators
Inverters
Ion exchange membrane electrolytes
Liquid metal fuel cells
Liquid metal MHD generators
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Magnetohydrodynamic generation
Magnetohydrodynamic generators
Magnets
Motor generators
Motors
Nuclear auxiliary power units
Nuclear power plants

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Energy Storage
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Battery depolarizers
Battery electrodes
Battery electrolytes
Battery separators
Battery testers
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Low temperature batteries
Metal air batteries
Missile batteries
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Primary batteries
Radioisotope batteries
Reserve batteries
Sea water batteries
Storage batteries
Thermal batteries
Torpedo batteries
Water activated batteries
Wet cells

1100 Materials

1101
Adhesives and Seals
Adhesive papers
Adhesives
Adhesive tapes
Dopes
Fuel seals
Gaskets
Gas seals
Glass seals
Glass to metal seals
Glue
Heat sealing
Hermetic seals
Hydraulic seals
Joint fillers
Joint sealers
Labyrinth seals
Metallic seals
Oil seals
O ring seals
Packing materials
Packings (seals)
Plastic seals
Plugs
Pressure sensitive adhesives

NASA THESAURUS (CATEGORY TERM LISTING)

010 Aerodynamic characteristics,
(cont)

THERMAL DIFFUSIVITY
 THICKNESS RATIO
 THIN AIRFOILS
 THIN BODIES
 THIN PLATES
 THIN WALLED SHELLS
 THIN WALLS
 THREE DIMENSIONAL BOUNDARY LAYER
 THRUST
 THRUST AUGMENTATION
 THRUST-WEIGHT RATIO
 TILTED PROPELLERS
 TIP SPEED
 TOULMIN-SCHLICHTING WAVES
 TORSIONAL VIBRATION
 TAILING EDGES
 TRAILING-EDGE FLAPS
 TRANSIENT LOADS
 TRANSITION LAYERS
 TRANSITION POINTS
 TRANSONIC FLIGHT
 TRANSONIC FLOW
 TRANSONIC FLUTTER
 TRANSONIC SPEED
 TRAPEZOIDAL TAIL SURFACES
 TUMBLING MOTION
 TURBIDITY
 TURBULENCE
 TURBULENCE EFFECTS
 TURBULENCE METERS
 TURBULENT BOUNDARY LAYER
 TURBULENT FLOW
 TURBULENT WAKES
 UNCAMBERED WINGS
 UNDAMPED OSCILLATIONS
 UNIFORM FLOW
 UNLOADING
 UNSTEADY FLOW
 UPWASH
 VARIABLE SWEEP WINGS
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 VELOCITY
 VELOCITY DISTRIBUTION
 VELOCITY ERRORS
 VELOCITY MEASUREMENT
 VENTS
 VIBRATION
 VIBRATION EFFECTS
 VIBRATIONAL STRESS
 VIBRATORY LOADS
 VISCOELASTIC CYLINDERS
 VISCOUS DRAG
 VON KARMAN EQUATION
 VORTEX BREAKDOWN
 VORTEX RINGS
 VORTICES
 WAKES
 WAVE DRAG
 WAVES
 WEDGE FLOW
 WEDGES
 WEIGHT (MASS)
 WIND (METEOROLOGY)
 WIND EFFECTS
 WIND TUNNEL STABILITY TESTS
 WINDS ALOFT
 WING CAMBER
 WING FLOW METHOD TESTS
 WING LOADING
 WING OSCILLATIONS
 WING PROFILES
 WING SPAN
 WING-FUSELAGE STORES
 WOODEN STRUCTURES
 YAW
 YAWING MOMENTS
 ZERO ANGLE OF ATTACK
 ZERO LIFT

 0102 AERODYNAMICS OF BODIES
 ABLATIVE MATERIALS
 ABLATIVE NOSE CONES
 AERODYNAMIC BALANCE
 AERODYNAMIC CHARACTERISTICS
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 AIRCRAFT CONFIGURATIONS
 AIRCRAFT STRUCTURES
 AIRFOIL FENCES

 AIRFOIL PROFILES
 AIRFOILS
 AIRRAMS
 ASPECT RATIO
 AXIS OF ROTATION
 AXISYMMETRIC BODIES
 AXISYMMETRIC FLOW
 BALLAST
 BLUFF BODIES
 BLUNT BODIES
 BOATTAILS
 BODIES OF REVOLUTION
 BODY-WING AND TAIL CONFIGURATIONS
 BOUNDARY LAYER CONTROL
 BOWS
 BULKHEADS
 CAMBER
 CASCADES
 CORE FLOW
 CURRENTS
 CYLINDRICAL BODIES
 DEFLECTORS
 DESIGN
 DUCTED BODIES
 ENCKE METHOD
 FAIRINGS
 FAN IN WING AIRCRAFT
 FEED SYSTEMS
 FENCES
 FILLETS
 FINNED BODIES
 FINS
 FLAPS (CONTROL SURFACES)
 FLARED BODIES
 FLEXIBLE BODIES
 FOLDING STRUCTURES
 FOREBODIES
 FRICTION DRAG
 FRICTIONLESS ENVIRONMENTS
 FROZEN EQUILIBRIUM FLOW
 FULL SCALE TESTS
 FUSELAGES
 GLIDE LANDINGS
 GLIDE PATHS
 GLIDERS
 GUST ALLEVIATORS
 GUST LOADS
 HALF CONES
 HALPHEN METHOD
 HAMMERHEAD CONFIGURATION
 HIGH ASPECT RATIO
 HULLS (STRUCTURES)
 HYPERVELOCITY FLOW
 INFINITE SPAN WINGS
 JOUKOWSKI TRANSFORMATION
 LAMINAR FLOW AIRFOILS
 LEADING EDGE SLATS
 LEADING EDGE SWEEP
 LEADING EDGES
 LIFT
 LIFT AUGMENTATION
 LIFT DEVICES
 LOW ASPECT RATIO
 LOW ASPECT RATIO WINGS
 MASS BALANCE
 MEMBRANE STRUCTURES
 METAL PLATES
 METAL SHELLS
 MISSILE STRUCTURES
 MONOCOQUE STRUCTURES
 MONOPLANES
 NACELLES
 NEWTON-BUSEMANN LAW
 NOSE CONES
 NOSE INLETS
 OGIVES
 PARAWINGS
 PLASTIC AIRCRAFT STRUCTURES
 POHLHAUSEN METHOD
 PORTS
 PRESSURE DISTRIBUTION
 PRESSURE REDUCTION
 PROPELLER SLIPSTREAMS
 PROTUBERANCES
 PYRAMIDAL BODIES
 RAMPS
 RIDGES
 RIGID MOUNTING
 RIGID WINGS

Figure 14

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BK-71 HEALTH STATISTICS	BL-56 INGESTION
BK-72 HEMATOLOGY	BL-57 INHIBITION
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BL-09 CIRCULATORY SYSTEM	BL-84 LUNG
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BL-11 HEART	BL-86 TRACHEAL
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BL-41 ALVEOLI	GR-10 EMPHYSEMA
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BL-43 SINUSES	GR-12 INFLUENZA
BL-44 TRACHEA	GR-13 LARYNGITIS
BL-45 SKIN	GR-14 PLEURISY
BL-46 EPITHELIUM	GR-15 PNEUMOCONIOSIS
BL-47 TISSUES	P-84 ANTHRACOSIS
	BL-78 ASBESTOSIS
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	S-84 FARMER'S LUNG
	GR-18 SILICOSIS
	GR-16 PNEUMONIA
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	GR-19 TUBERCULOSIS
	GR-20 STERILIZATION
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FIG. 1. Microthesaurus of air pollution terms; biosciences and medicine